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PATENTS
SG-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Applicants	:	Joshua D. Spodek et al.
Application No.	:	09/689,239
Confirmation No.	:	7840
Filed	:	October 11, 2000
For	:	APPARATUS FOR DISPLAYING MULTIPLE SERIES OF IMAGES TO VIEWERS IN MOTION
Group Art Unit	:	2851
Examiner	:	Rodney E. Fuller

Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF JOSHUA D. SPODEK
UNDER 37 C.F.R. § 1.131

Sir:

I, JOSHUA D. SPODEK, hereby declare that:

1. I am one of the co-inventors/applicants named on United States Patent Application No. 09/689,239, filed October 11, 2002; I reside at 33 Greenwich Avenue, Apt. 5C, New York, New York 10014; I am a co-founder of Submedia, LLC, assignee of the above-identified patent application; and I make

this declaration under 37 C.F.R. § 1.131 in support of Application No. 09/689,239;

2. Annexed hereto as Exhibit A is a copy of my notebook, pages 1-3, 46-49, 71, 72, 90, 91, 93-95, 115-119, and 121, showing our invention directed to multiple series of images that appear animated to viewers in motion. Still images from one series ("A" images) are interspersed and mounted with a second series ("B" images) on a backboard.

3. My notebook of Exhibit A was dated; the dates have been masked and the word "MASKED" has been added to Exhibit A to indicate where the dates have been masked; I have reviewed another unmasked copy of my notebook used to make Exhibit A, and I hereby state that all masked dates in Exhibit A are prior to August 26, 1999;

4. Annexed hereto as Exhibit B is a copy of my "to do" list showing, among other things, a task to write a patent disclosure for our invention claimed in Application No. 09/689,239 (see fourth bullet under Submedia: "Write multi-image-per-slit patent");

5. My "to-do" list of Exhibit B was dated; the dates have been masked and the word "MASKED" has been added to

Exhibit B to indicate where the dates have been masked; I have reviewed another unmasked copy of my "to-do" list used to make Exhibit B, and I hereby state that the masked dates in Exhibit B are prior to August 26, 1999;

6. All of my work on the invention shown in Exhibit A and referred to in Exhibit B was performed in the United States;

7. The foregoing establishes that our invention claimed in Application No. 09/689,239 had been conceived of and reduced to practice prior to August 26, 1999; and

I hereby further declare that I understand the English language and that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code

and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

November 20, 2003
Date

Joshua D. Spodek

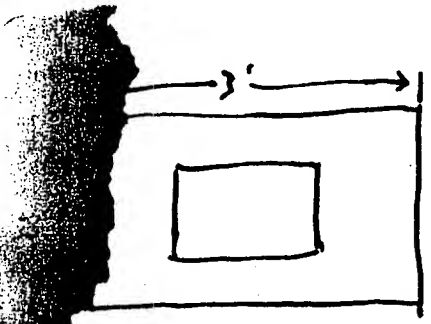
EXHIBIT A

Joshua S[illegible]ek

MASKED

This is the true and complete copy of my experiments and work book relating to the patent.

Joshua Szodek



for a TV size image, maybe two feet by two feet. We don't know the typical train speeds at different places on the track line, but let's say the slowest speed we have to deal with is 30 mph. The slowest speed corresponds to the densest spacing between frames.

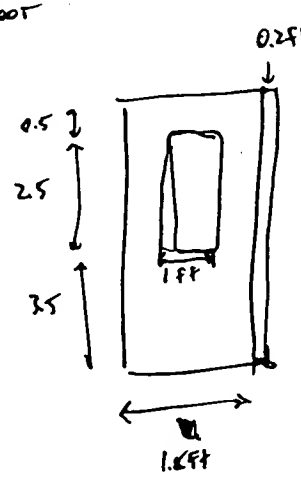
Movies run at 24 frames per second, so we should shoot for that speed. What does our spacing between frames have to be?

$$24 \frac{\text{frames}}{\text{sec}} \times \frac{\text{hr}}{30 \text{ miles}} \times \frac{3600 \text{ sec}}{\text{hr}} \times \frac{\text{mile}}{5280 \text{ ft}} = 0.545 \frac{\text{frames}}{\text{ft}}$$

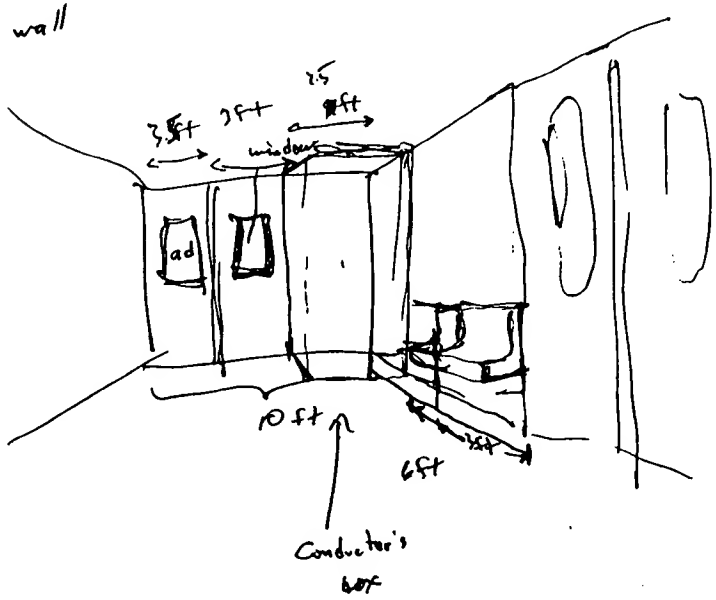
or 1 frame every 1.83 ft.

MASKED

Door



end wall



MASKED

[redacted] a while, but I've been busy with [redacted], which keeps me away from this. Also, [redacted] a really nice animation: The viewer [redacted] down the subway car, looks right, which is [redacted] the window, and sees the animation begins

~~[redacted]~~

New Idea:

Ever look at one of those little stickers that switches images as you rotate it about one axis, or if you move up and down (or left and right, depending on the axis)?

Matt and I tried to figure out how they work. I came up with the answer (I'd kind of wondered about it for a while now). Matt confirmed my answer with a guy who makes them

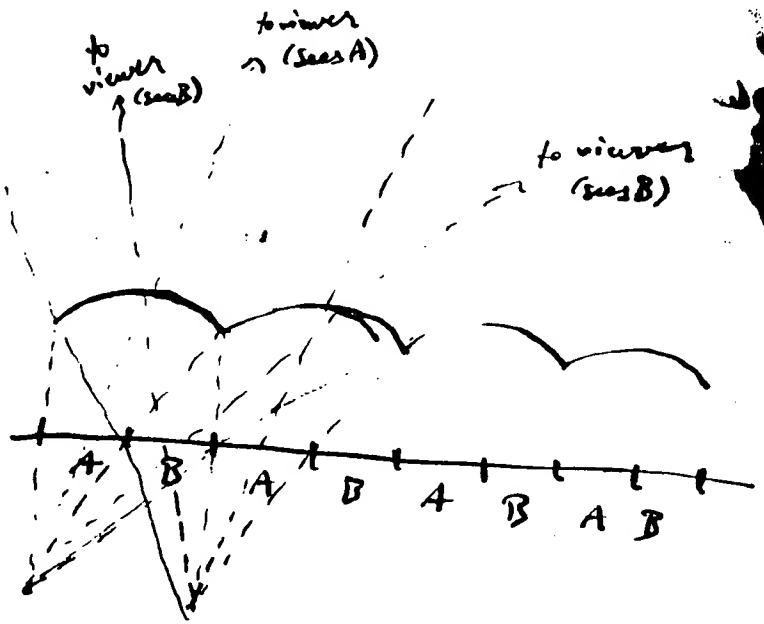
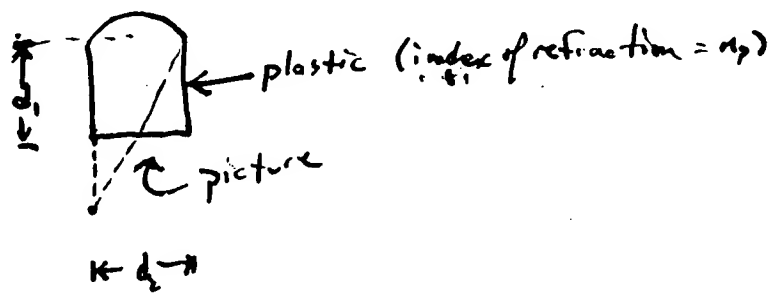


Figure out how it works yourself from the diagram. As the viewer moves around, he or she sees image A and B alternating with position.

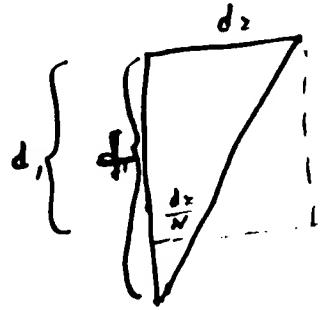
The curves on the top are cylindrical lenses with a focal length of f twice the distance from the (thin) lens to the plane with the pictures.

The basic unit is:



If we alternate between two images $f = 2 \cdot d_1$

If we alternate between N images



$$\frac{\frac{d_2}{N}}{f} = \frac{\frac{d_2}{N}}{f - d_1}$$

$$N(f - d_1) = f$$

$$-Nd_1 = f(1 - N)$$

$$f = \frac{N}{N-1} d_1$$

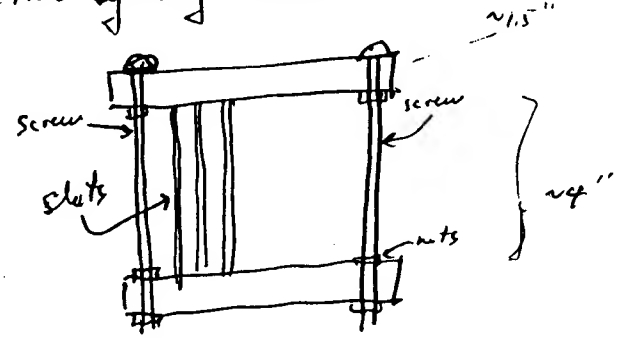
which is a more general result. I don't think we'll use it though.

Long break since last update.
A very brief review of what's happened:

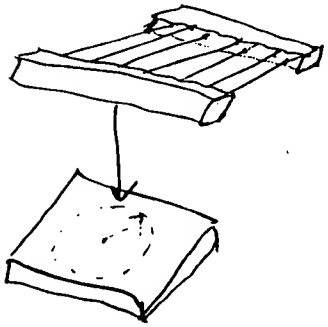
Matt and I finally completed building a device made up of units such as shown on pages 29-35. I forget the exact dimensions we used, but I think they were based on a slat width of 1.5 inches, a viewer distance of about 6 feet, and limit points of a few inches.

~~[illegible]~~

The animation was a clock face with one hand turning. The slats were made of thin aluminum sheets, cut by hand. The slat holders were wood with grooves chiselled in to hold the slats. The slat holders were held together by long screws.



The slat holder with slats was screwed onto a backing board which had an animation frame on it.



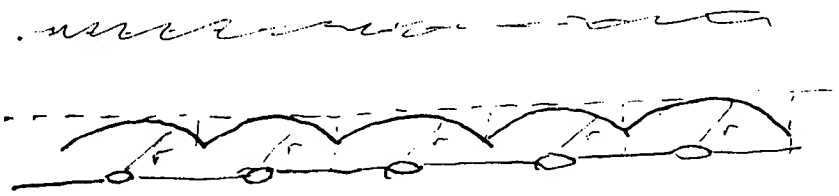
We did our best to keep tolerances low, in particular the planarity of the slats and their proper positioning.

We figured if the device were to work, even not-so-good tolerances would permit the effect to work. Once it worked we could build a better one, bolstered in confidence from the success of our first attempt.

New idea to solve multiple image viewability and blurring problem:

Instead of simple slots in front of a flat board holding all the frames, put lenses in the slots. The lenses should be prism like (i.e 2 dimensional profile extended in the third direction, not spherical). The back board, which holds the frames should be a series of circular cylinder segments, with radius equal to the focal length of the lens. If the viewer is always far enough away that the distance is close enough to ∞ in $\frac{1}{o} + \frac{1}{i} = \frac{1}{f}$, where f and i are fixed, the projected width of the slot is much smaller and blurring decreases.

Also, the semi-circularness decreases the other frames' viewability.



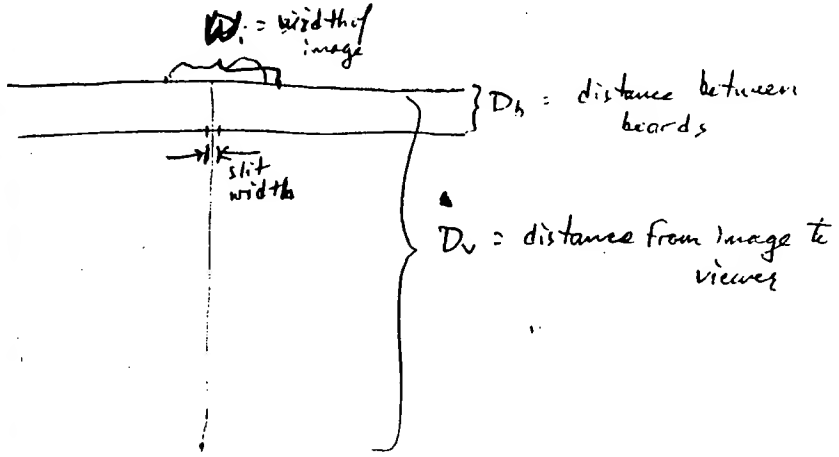
$r = i \lesssim f$.

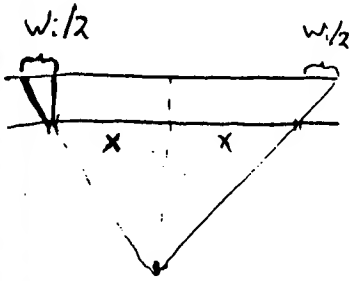
Actually, i must be less that f. When i = f magnification is infinite. Magnifying glasses don't work when i is too close to f.

MASKED

How great is the "magnification"?

"Magnification" is the effect that an image looks wider due to the effects described around pages 86-87.





← slits are at positions showing extremes of viewability of an individual frame.
Note similar triangles

$$\frac{x + \frac{W_i}{2}}{D_v} = \frac{W_i/2}{D_b}$$

$$x = \left(\frac{D_v}{D_b} - 1\right)\frac{W_i}{2}$$

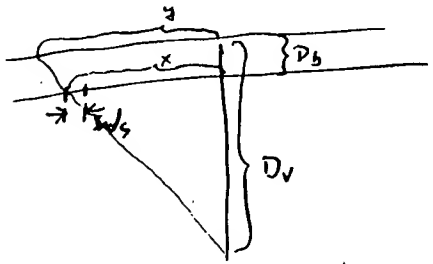
$$2x = \left(\frac{D_v}{D_b} - 1\right) W_i$$ = perceived width of image.

So the "magnification"

$$= \frac{D_v}{D_b} - 1 \approx \frac{D_v}{D_b}$$

$$\approx 11 \quad \text{for } D_v = 6 \text{ feet}, \; D_b = 6 \text{ inches}$$

How much accuracy is lost at the edges? Remember that the width of the slit ~~camera~~ averages over the image on the scale of its projected width.



$$\frac{x}{D_v - D_b} = \frac{y}{D_v}$$

$$y = x\left(\frac{D_v}{D_v - D_b}\right)$$

$$\frac{x - w_s}{(D_v - D_b)} = \frac{y - \Delta y}{D_v}$$

$$y - \Delta y = (x - w_s)\left(\frac{D_v}{D_v - D_b}\right)$$

$$\Delta y = w_s \frac{D_v}{D_v - D_b} \approx w_s \times 1.1 \quad \text{for } D_v = 6', \; D_b = 6''$$

So the blurring does not increase much. It is independent of how far out the image is visible.

What is the refresh rate if the perceived width is $w_i\left(\frac{D_v}{D_b} - 1\right)$? It seems like it should decrease.

But no. Each part of the image is viewable once every time the train is in the same position relative to a slit.

$$t = \frac{\text{distance}}{\text{rate}} = \frac{w_i}{v} = \frac{18 \text{ inches}}{30 \frac{\text{miles}}{\text{hr}}} \times \frac{3600 \text{ sec}}{\text{hr}} \times \frac{\text{mile}}{5280 \times 12 \text{ inch}}$$

$$= 3.4 \times 10^{-2} \text{ sec}$$

$$\text{frequency} = \frac{1}{t} = 29 \text{ frames per second} \quad (\text{at } 25 \text{ mph}: 24.4 \text{ fps})$$

[redacted] MASKED

Josh,

Spoke with Holtz today.

His phone:
Fax: PHONE #'S MASKED

He agreed that a provisional patent application should be the first step. The description of our invention, called the Disclosure, should look as much as possible like an actual patent, according to Holtz. It should be as DETAILED as possible, and should include sketches. Hand sketches, rather than engineering sketches, will suffice.

Though the description should be detailed, we should make it easy enough for a monkey to understand.

Holtz advised that we should look at some existing patents and model our disclosure after them.

We should fax our draft of the disclosure to Holtz, who will review it prior to our meeting [redacted] MASKED . (Sorry, he's got a morning appointment.) We'll review it together at the meeting. Holtz will do a full-scale patent search, and will hone our disclosure.

Josh, I think it would also be a good idea to mention in your fax to Holtz a) the patents we've found on our search, and b) the news you've heard about the Chilean and German near-movilizes.

I'll try to hunt down a place to receive e-mail in France. I'm sure there'll be internet cafes in Paris, where I'll be MASKED

If you need to reach me at my hotel in Paris, it's the hotel Chevreuse, phone: 011 33 1 43 20 93 16.

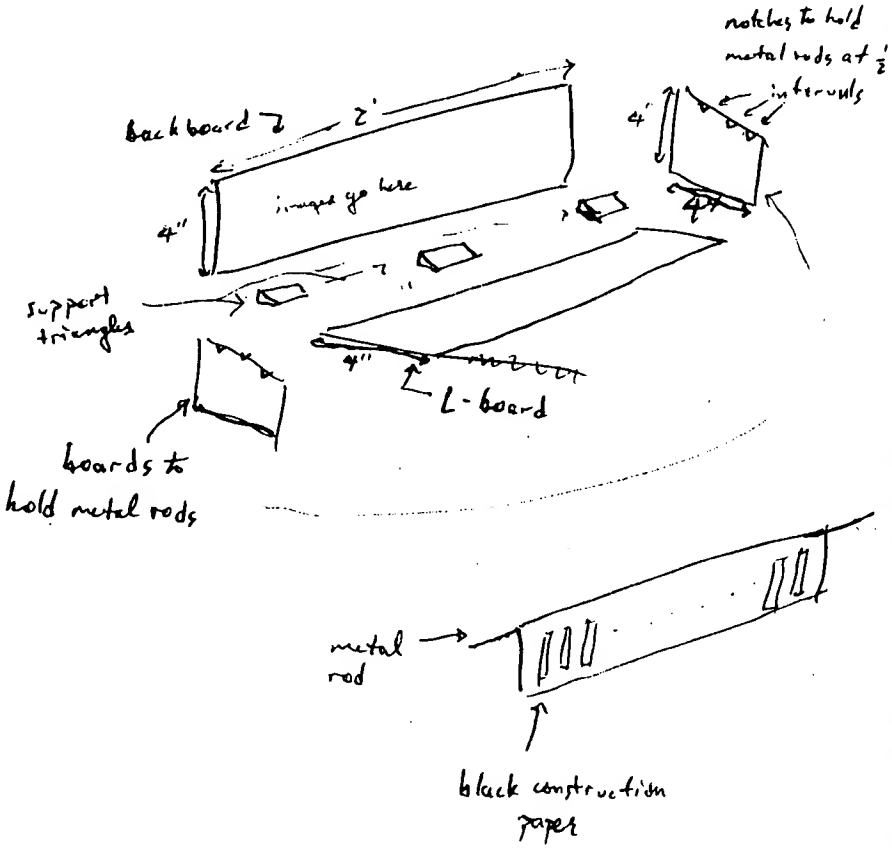
Matt

MASKED

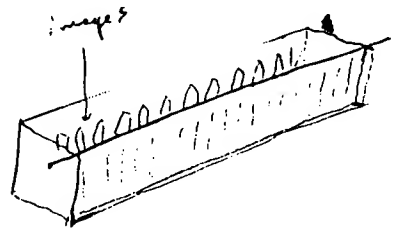
Huge success! I built some small models to see if they would work at walking speed and they do!

~~The Rotating~~

I made five identical units to be lined up sequentially, each one similar in design to the design on page 102. The backboard and L-board are made of some cheap balsa wood. The slitboard is made of black construction paper supported by metal rods.



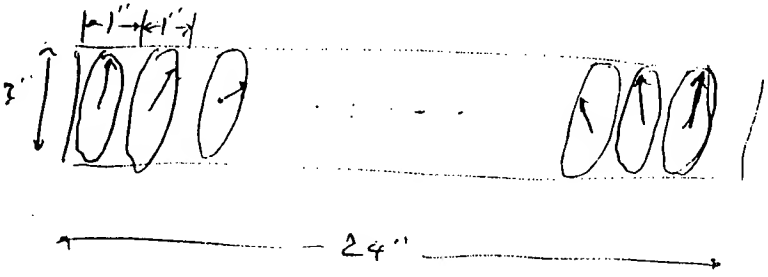
The final product looks like



slits: approx $\frac{1}{32}$" wide, $3\frac{1}{2}$" high, [redacted] at 1" intervals

The slits were made as thin as possible with an x-acto knife without creating ragged edges that create streaks when the device is viewed in operation.

The frames are sequential "clock" frames, like this:



The clock frames start as ellipses with arrows

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\quad a = 1$ inch
$\quad b = 3$ inches

so that the "magnification" will make them circles at a few feet away from the slitboard. The 1" spacing came from the calculation on page 112. The 3" height was determined by the materials I had to make the device with at the art store.

The animation clearly works. The magnification also works as predicted, though I haven't checked it quantitatively. It certainly increases approximately linearly with distance. When you put the slitboard an inch away from the backboard and hold the whole device at arm's length the clocks become ellipses the other way — ie very wide.

Also you can see the effect of multiple frames showing up in the same viewed image, sometimes you can see more than one arrow on the clock you see when you view it in operation. Slowing down the animation by making the arrows go by a smaller angle between successive frames helps. I did two sets of frames, one where the clock went once around in 24 frames and one where it went around twice in 24 frames. The latter definitely looked better animation-wise, but the former also worked well.

The device worked successfully, but since I didn't know it would a priori, I made it cheaply and quickly. Matt is going to start working on a more presentable model, probably metal with an included light source.

I've written a draft of the provisional patent, which I'll tape in here. We showed it to Hotte, the patent lawyer. He had some comments, but wasn't too clear. We've since decided to try someone else to see how their "bedside manner" works with us. We haven't yet started a professional patent search or sent in the provisional patent.

Still refining the business plan...

EXHIBIT B

Submedia, LLC

Josh's to do lists, MASKED

Submedia:

- Get contacts for new printers/die cutters, call, order new prints
- Call Preston about lawyer, update
- Go to abandoned Myrtle Street station
- Write multi-image-per-slit patent
- Discuss with Matt:
  - we *should* convert the apartment to an office, but make sure terms are all figured out beforehand
  - frequently impossible to reach despite 3 phone numbers and email
  - parents' share of equity messes up our equality of who owns how much (may tap into deep issues of contribution/ownership)

High Priorities:

- Printer/printing services
- Laser/Die cutting services
- Office space
- MTA relations, find reason to call Fennick
- Universal and competitor negotiations to start building
- Funding from Matt's family and Preston
- SALES!!! (requires better presentation model)
- Airport model, patent development

Personal:

- Tax forms for MASKED
- Find apartment